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FLS miljø Group

FAX **Fax No:** 510 866 6350 **Total Pages:** 5

Date: January 23, 1997

To: Kvaerner Davy

Attn: Aileen Castenada

From: Charles Leivo and Trinh Tran

Ref: Solvay Minerals, Inc.

Subject: Emission Design Basis for ESPs on Calciner and Dryer

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Copy: Dolly A. Potter
Solvay Minerals, Inc.
Fax 307 872 6510

Reid Baumgartner
Fax 303 447 8997

According to our discussion this morning, we will call you at 1:30 PM your time today to discuss our analysis of the following data. No need to study it in advance; we'll just plan to walk you through it.

Attached are two tables, one for calciner and one for dryer, which summarize:

1. The 1994 emission test data for the existing ESPs (Dolly Potter's fax of January 16, 1997)
2. The design basis for the existing ESPs (same fax)
3. The design basis for the new ESPs
4. Some calculations for the new design basis which account for the fact that the back half condensibles will pass through the ESP without being collected. Therefore, the ESP must be designed to collect more than enough front half particulate so that when we add on the back half emissions, we will be within the overall guarantee.

Comments on 1994 Tests versus 1994 Design Basis

It should be noted that the 1994 test summary indicates the tests were conducted under conditions significantly less stringent that the design basis for the existing ESPs, and that this would result in much lower emissions than the design basis at that time:

	Calciner	Dryer
Design Volume (by ratio)	172,000 acfm	126,000 acfm
Test Volume	135,833 acfm	76,330 acfm
Test Treatment Time as % of Design	+22%	+60%
ESP Fields	6 tested	5 tested
Design	5 test + 1 out	4 test + 1 out
Test Fields as % of Design	+20%	+25%
Total Treatment Time as % of Design	+42%	+85%

Just for talking purposes, we would suggest that had the ESPs been tested at design flows and with the spare fields out of service, then the measured emissions would be in the range of 4 to 5 times higher than actually achieved. Not only was treatment time much higher, but also the velocity was much lower as well through the ESPs, thereby reducing any re-entrainment.

New ESP Design

For this we propose to discuss the tables, with the following in mind:

1. We must size the ESPs to be over-achievers on the front half particulate to meet the total emissions.

2. The back half condensibles will pass through the ESPs without being collected.

   Therefore we need a method for commercial guarantee reasons to agree on some acceptable level of condensibles that will be present.

   If you should have any composition data or information relating to the origins of the condensibles, we could perhaps make some comments as to whether or not there could be other methods to reduce them (besides ESPs).

3. The calculated front half requirements for particulate removal are low enough that they are approaching or exceeding measurement/accuracy levels for the test procedures. We will need to develop test protocol. This would relate to sample times and also to the number of samples to be taken and averaged. Furthermore, there will be some level that we will have a general discomfort level in going below for commercial reasons, not wanting to take a chance on the testing procedures. (Designing for the ESP performance is a different matter.)

Following our discussions with you, we will develop sizing information for the ESPs. However, our concern is that we will be looking at the possibility of significantly larger ESPs than are already in place on the existing line.

Sincerely,

Charles Leivo Trinh Tran

P.S. We note for now that we're carrying some modest mathematical bug in the Dryer table due to inconsistencies in the percentage compositions for acf versus dscf.

Solvay Minerals, Inc.
Emission Test Results from Existing ESP and
Design Requirements for New ESP

FLS miljo Inc.
23-Jan-97

		1994 TESTS					1994 ESP		1997 ESP GUARANTEE		Calculated Front Half to Achieve Guarantee (same back half)			
		TEST 1	TEST 2	TEST 3	AVERAGE		Design	Test/Dsgn Vol., %	BASE	ALT.	BASE		ALT.	
CALCINER														
Gas Conditions														
Volume	acfm	149,000	139,000	119,500	135,833				346,000	346,000	346,000		346,000	
	dscfm	47,010	44,330	37,890	43,077		54,507	79%	92,346	92,346	92,346		92,346	
Temp.	F	350	352	351	351				500	500	500		500	
Pressure	psia								11.65	11.65	11.65		11.65	
H2O	%	39.29%	38.50%	38.84%	38.88%				38%	38%	38%		38%	
Front Half Particulate	gr/acf	0.0006	0.0005	0.0005	0.0005	16%					0.0016	40%	0.0006	19%
Back Half Inorganic	gr/acf	0.0024	0.0036	0.0026	0.0029	84%					0.0024	60%	0.0024	81%
Total	gr/acf	0.0030	0.0041	0.0031	0.0034	100%			0.0040	0.003	0.0040	100%	0.0030	100%
Front Half Particulate	gr/dscf	0.0018	0.0016	0.0016	0.0017	16%					0.0059	40%	0.0022	19%
Back Half Inorganic	gr/dscf	0.0075	0.0114	0.0083	0.0091	84%					0.0091	60%	0.0091	81%
Total	gr/dscf	0.0093	0.0130	0.0099	0.0107	100%	0.0200		0.015	0.0112	0.0150	100%	0.0112	100%
Front Half Particulate	lb/hr	0.77	0.60	0.51	0.62	16%					4.70	40%	1.71	19%
Back Half Inorganic	lb/hr	3.07	4.29	2.66	3.34	84%					7.18	60%	7.18	81%
Total	lb/hr	3.83	4.88	3.18	3.96	100%	9.34		11.87	8.90	11.87	100%	8.90	100%
Front Half Particulate	mg/Am3				1.22	16%					3.62	40%	1.32	19%
Back Half Inorganic	mg/Am3				6.56	84%					5.55	60%	5.55	81%
Total	mg/Am3				7.79	100%			9.17	6.87	9.17	100%	6.87	100%

50' long

0.0016 - lower than practical limit to detect

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Solvay Minerals, Inc.
Emission Test Results from Existing ESP and
Design Requirements for New ESP

FLS miljo Inc.
23-Jan-97

		1994 TESTS					1994 ESP		1997 ESP GUARANTEE		Calculated Front Half to Achieve Guarantee (same back half)			
		TEST 1	TEST 2	TEST 3	AVERAGE		Design	Test/Dsgn Vol., %	BASE	ALT.	BASE		ALT.	
DRYER														
Gas Conditions														
Volume	acfm	78,800	75,680	74,510	76,330				186,000	186,000	186,000		186,000	
	dscfm	21,930	20,840	20,460	21,077		34,953	60%	44,314	44,314	44,314		44,314	
Temp.	F	309	308	310	309				500	500	500		500	
Pressure	psia								11.65	11.65	11.65		11.65	
H2O	%	49.38%	49.94%	49.96%	49.76%				45%	45%	45%		45%	
Front Half Particulate	gr/acf	0.0001	0.0001	0.0001	0.0001	9%					0.0016	65%	0.0011	57%
Back Half Inorganic	gr/acf	0.0022	0.0001	0.0008	0.0010	91%					0.0008	35%	0.0008	43%
Total	gr/acf	0.0023	0.0002	0.0009	0.0011	100%			0.0024	0.0019	0.0024	100%	0.0019	100%
Front Half Particulate	gr/dscf	0.0004	0.0003	0.0003	0.0003	8%					0.0062	62%	0.0042	53%
Back Half Inorganic	gr/dscf	0.0078	0.0005	0.0031	0.0038	92%					0.0038	38%	0.0038	48%
Total	gr/dscf	0.0082	0.0008	0.0034	0.0041	100%	0.0160		0.010	0.008	0.0100	100%	0.0080	100%
Front Half Particulate	lb/hr	0.07	0.06	0.06	0.07	9%					2.35	62%	1.60	53%
Back Half Inorganic	lb/hr	1.49	0.06	0.51	0.69	91%					1.44	38%	1.44	48%
Total	lb/hr	1.55	0.13	0.57	0.75	100%	4.79		3.80	3.04	3.80	100%	3.04	100%
Front Half Particulate	mg/Am3				0.23	9%					3.56	65%	2.47	57%
Back Half Inorganic	mg/Am3				2.37	91%					1.90	35%	1.90	43%
Total	mg/Am3				2.60	100%			5.46	4.36	5.46	100%	4.36	100%